PO1008

Development of optical microcavities based on amorphous thin films

Ivan Braga Gallo[1], Antonio Ricardo Zanatta[1]

[1]USP - IFSC, São Carlos, Brazil

ivanbragagallo@yahoo.com.br

Modern optically-based technological applications require structures able to provide the appropriate control of the properties of light. As a result, different approaches has been proposed and studied along the last years. One of these approaches is based on the use of optical microcavities (MC's) which, due to their characteristics, are very attractive to the emerging photonics industry. Besides, MC's can contribute to the achievement and/or improvement of light sources such as lasers and LEDs, for example. In this context, the study of MC's with transmission windows in the visible and near-infrared regions is the main goal of the present work. Basically, MC's are multilayer structures fabricated, in this case, by the radio frequency sputtering technique. Amorphous SiN, AlN, and SiH thin films were considered in the fabrication of the present MC's, which also contain an active layer (essentially a rare-earth-doped film) emitting at the MC window. Characterization of the MC's comprised: optical transmission and reflection in the UV-VIS-NIR range and, photoluminescence measurements in the VIS-NIR. Optical transmission measurements revealed that MC's with transmission windows at ~ 550 and ~ 1550 nm can easily be produced by alternating a-SiN/a-SiH (MC550) and a-SiN/a-Si (MC1550) layers. The optical transmission window is determined by the thickness and index of refraction of the individual layers making the method very convenient and technologically attractive. At present we are involved in the optimization of the optical emission of the MC's as well as in the production of new MC's with different transmission windows.

Keywords
Sputtering
Optical Microcavities
Nitrides
Rare-earth